

इंटरनेट

मानक

Disclosure to Promote the Right To Information

Whereas the Parliament of India has set out to provide a practical regime of right to information for citizens to secure access to information under the control of public authorities, in order to promote transparency and accountability in the working of every public authority, and whereas the attached publication of the Bureau of Indian Standards is of particular interest to the public, particularly disadvantaged communities and those engaged in the pursuit of education and knowledge, the attached public safety standard is made available to promote the timely dissemination of this information in an accurate manner to the public.

“जानने का अधिकार, जीने का अधिकार”

Mazdoor Kisan Shakti Sangathan

“The Right to Information, The Right to Live”

“पुराने को छोड़ नये के तरफ”

Jawaharlal Nehru

“Step Out From the Old to the New”

IS 8486 (1977): Code of practice for maintenance of tungsten carbide tipped integral stems [PGD 8: Pneumatic Tools]



“ज्ञान से एक नये भारत का निर्माण”

Satyanarayan Gangaram Pitroda

“Invent a New India Using Knowledge”



“ज्ञान एक ऐसा खजाना है जो कभी चुराया नहीं जा सकता है”

Bhartrhari—Nitiśatakam

“Knowledge is such a treasure which cannot be stolen”

BLANK PAGE





Indian Standard

CODE OF PRACTICE FOR MAINTENANCE OF TUNGSTEN CARBIDE TIPPED INTEGRAL STEMS

1. Scope — Lays down the procedure for the proper maintenance of tungsten carbide tipped integral stems conforming to IS : 7913-1975 'Specification for integral stems for percussive drilling' for obtaining the maximum efficiency from them.

2. Terminology — Different parts and other terms used in connection with tungsten carbide tipped integral stems are shown in Fig. 1.

3. Types of Wears

3.1 Frontal Wear — Frontal wear occurs when drilling is done in hard rocks, such as granite and gneiss. This develops as a gradually widening flat surface on the cutting edge. Frontal grinding shall be carried out when the width of the cutting edge of the insert amounts to 3 mm, when measured at 5 mm from the periphery of the insert. This can be checked by using grinding template (see Fig. 2).

3.2 Gauge Wear — Gauge wear occurs when the drilling is done in abrasive rocks, such as quartzite. The corners of the insert get worn abnormally fast, resulting in rounding of the insert. If this rounding is allowed to continue, the wear on the insert becomes very heavy and instead of a clearance, an anti-taper is formed. In case, the drilling is continued with an anti-tapered steel, insert failures may occur as the insert is subjected to abnormally severe stress arising from the wedge action against the hole walls (see Fig. 3). These severe stresses brought on by excessive anti-taper may result in rod breakage. The corner wear can be checked by measuring the height of the anti-taper using the grinding template. The stems shall be reground on the gauge when the anti-taper height becomes approximately 8 mm (see Fig. 4).

3.2.1 The anti-taper height is the height of the cutting edge to the point where the clearance begins.

3.3 Propeller Wear — Propeller wear is a special kind of wear and is actually a combination of wear and deformation. It is generally caused by poor rotation of drill rod or by unsatisfactory clearing of cuttings, which in turn is due to poor air or water pressure for flushing. In very soft rock, the cuttings may cause propeller wear even when the air or water pressure is normal. The reason being the fast penetration rate due to which the cuttings are not cleared quickly enough. Figure 5 shows the way in which stem is worn away and deformed along the cutting edge, especially on the leading side. Because of this the tungsten carbide insert becomes inadequately supported at the sides and the risk of insert failure becomes imminent.

3.4 Snake-Skin Wear — When drilling in certain soft rocks like magnetite, a wear surface similar to snake-skin is frequently developed (see Fig. 6). This characteristic appearance is formed by a network of cracks about 0.1 mm deep. When snake-skin is found there is a very great risk of insert breakage. It is, therefore, most important that these cracks be removed altogether when regrinding even if appreciable wear has not taken place.

3.4.1 It is advisable to regrind lightly after about 150 m of drilling even if there is no detectable wear, while drilling in soft rock.

4. Grinding Procedure

4.1 For Frontal Wear

4.1.1 The purpose of grinding for frontal wear is to restore the cutting edge of the bit. The most economical procedure is to regrind both sides equally to the point where a sharp edge is obtained along about three-fifths of the bit diameter. The sharp edge shall be honed to a width of 0.5 mm (see Fig. 7) as otherwise fine hair cracks will develop and cause the insert to break prematurely. The honing shall be carried out with an old worn grinding stone.

4.1.2 In case of hand grinding, the edge angle and the cutting edge radius of the insert shall be checked continuously to ensure that excessive tungsten carbide is not ground off. The edge angle and insert radius on a correctly ground bit shall be 110° and 80 mm respectively. Both can be checked conveniently with the template as shown in Fig. 8. Care shall be taken during grinding to keep the cutting edge straight and in the centre of the bit.

4.2 For Gauge Wear — The most convenient way of grinding for gauge wear is to use an ordinary bench grinder with a straight grinding wheel. The procedure is to grind down the diameter until the

Adopted 13 June 1977

© March 1978, ISI

Price Rs. 5.00

Gr 3

height of the anti-taper has been reduced to a height of 6 mm to ensure satisfactory clearance. It is also important to remove as much steel as necessary, below the insert (see Fig. 9). In certain kinds of rock, the drills or steels are subjected to heavy gauge wear but little frontal wear. In such cases it is often possible up to a point, to reduce the anti-taper by frontal grinding only (see Fig. 10).

4.2.1 After grinding, the diameter of the insert shall be checked with a sliding caliper and the stems shall be assigned to the suitable series.

4.3 For Propeller Wear — If the propeller wear is not excessive, a combination of frontal and gauge grinding shall be done. Particular care shall be taken with stems on which the steel has been worn away so as to expose the corners of the insert. On stems worn in this way, the protruding parts of the insert shall be ground away if the insert breakage is to be avoided (see Fig. 11).

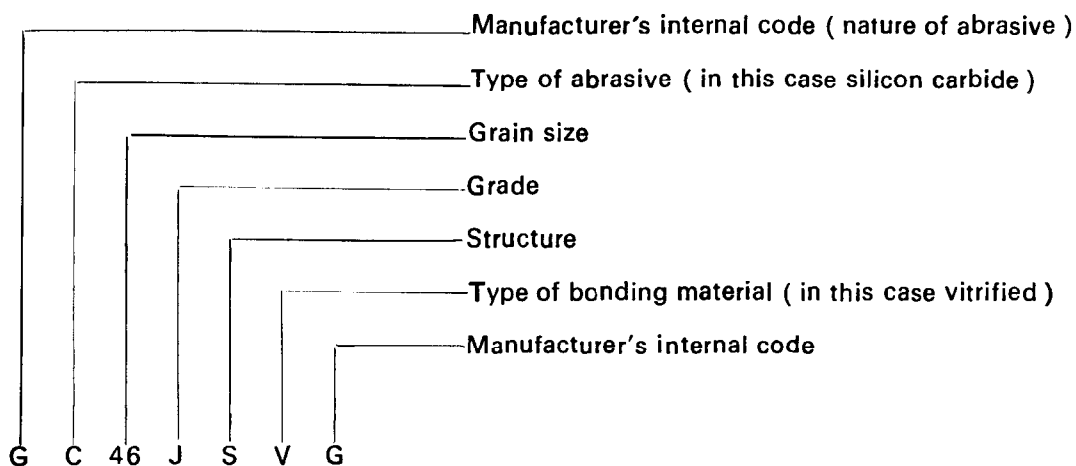
4.4 For Snake-Skin Wear — When snake-skin wear occurs, the surface cracks shall be completely removed by grinding. The stem shall thus be ground down a little more than normal, and afterwards the insert shall be heavily honed, both along its cutting edge and on the sides.

5. Grinding Technique

5.1 Selection of Grinding Wheel

5.1.1 Wheel designation — It is extremely important that the proper grinding wheel is used to grind integral stems. Use of the right quality wheel has great influence on the grinding cost and bit life. Vitrified bonded silicon-carbide wheels shall be used for grinding tungsten carbide tipped integral stems. The suitability of a wheel is also decided by such factors as hardness, grain size and structure. A too hard or too fine grained wheel will be clogged with steel and the tungsten carbide insert will get over-heated (such inserts will have a shiny 'burnt' appearance). Grinding cracks will then be formed in the insert resulting in insert failure. In addition, the grinding operation will also be slowed down. A coarse grained wheel will produce deep scratches on the tungsten carbide forming starting points for insert failure.

5.1.1.1 A typical designation of grinding wheel according to IS : 551-1966 'Marking system for grinding wheels (revised)' suitable for grinding integral stems is given below:



5.1.2 Wheel diameter — Straight or cup wheels shall be used for grinding integral stems. Diameter of the wheel shall be suitably selected from IS : 2324-1971 'Dimensions for grinding wheels other than internal grinding (first revision)'. As vitrified bonded wheels are preferred for grinding of the integral steels, the diameter of the wheel selected shall be such that the peripheral speed of the wheel does not exceed 33 m/s [see IS : 1991-1973 Safety code for grinding wheels (first revision)].

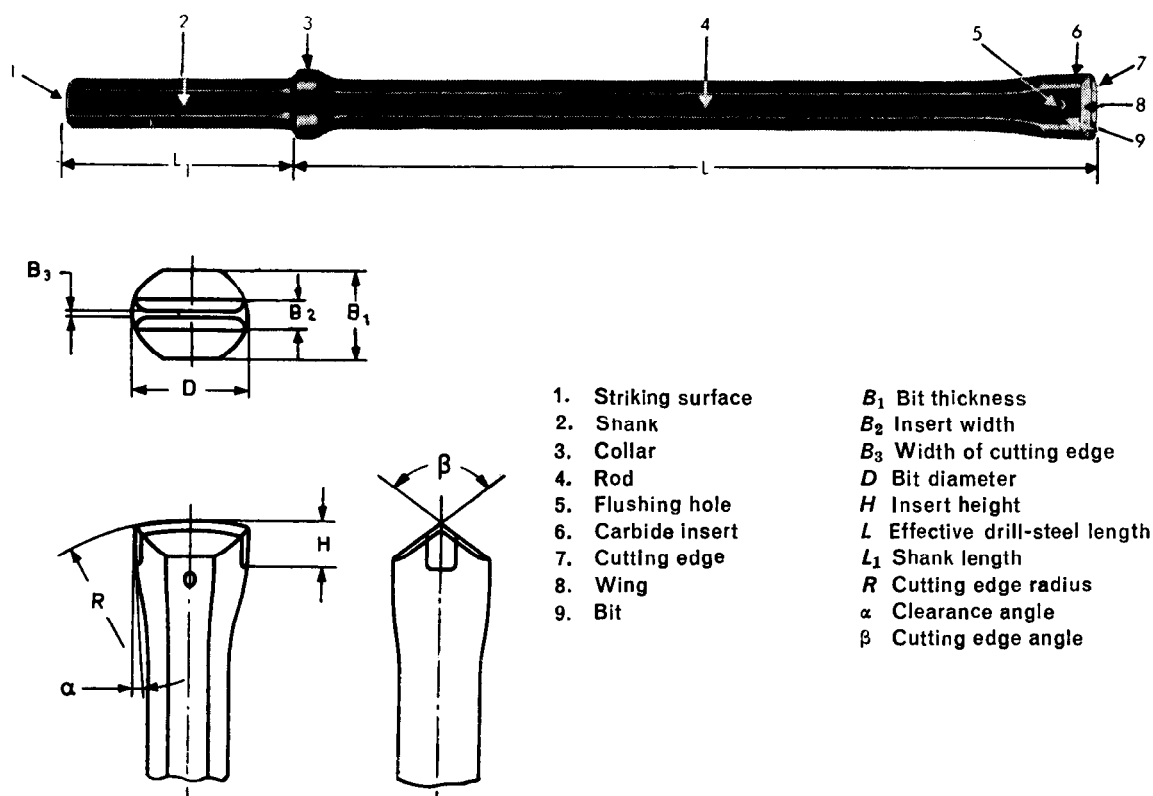


FIG. 1

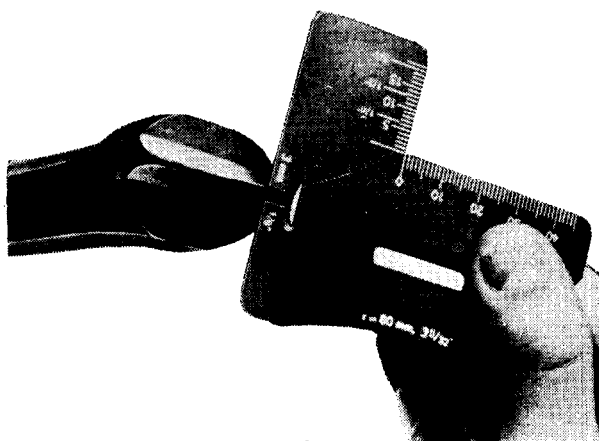


FIG. 2

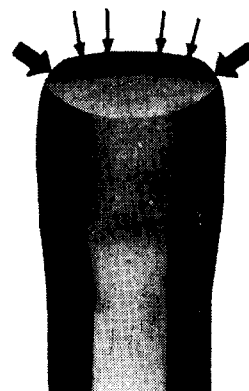


FIG. 3

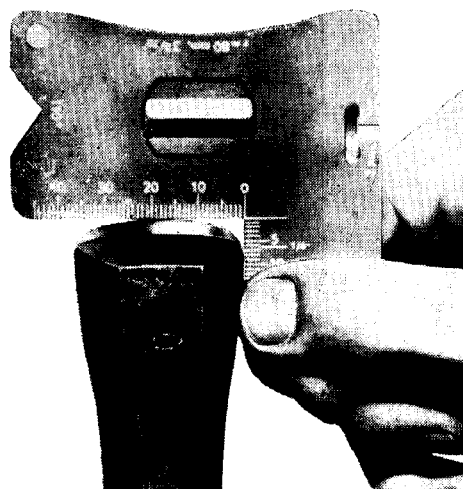


FIG. 4



FIG. 5

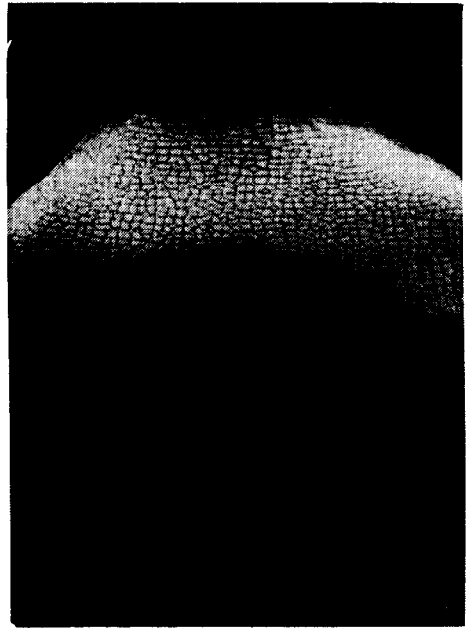


FIG. 6

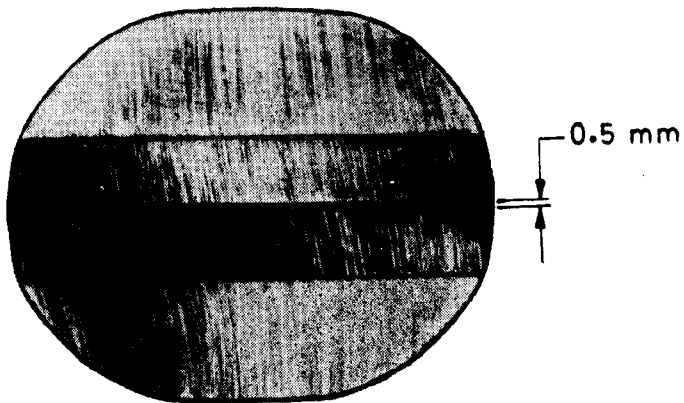


FIG. 7

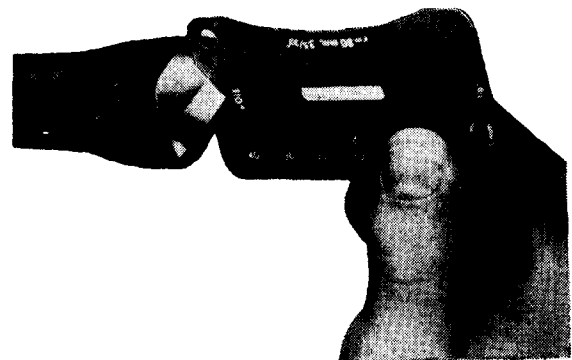


FIG. 8

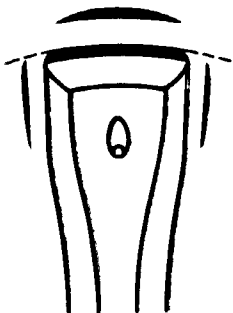


FIG. 9

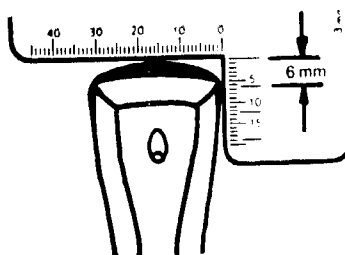


FIG. 10

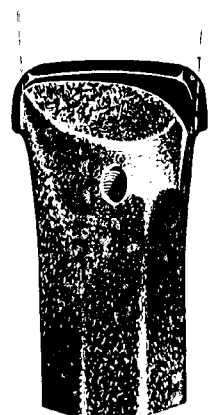


FIG. 11

5.2 Amount of Grinding — The bit shall be ground in such a way that a sharp edge is obtained along about three-fifths of the bit diameter (see 4.1.1). The graph (see Fig. 12) shows that if a bit is ground down 0.5 mm or 1 mm too much on each side on the front at each regrind, its useful life is reduced to 56 percent and 39 percent respectively of the normal life. This emphasizes the need for correct amount of grinding.

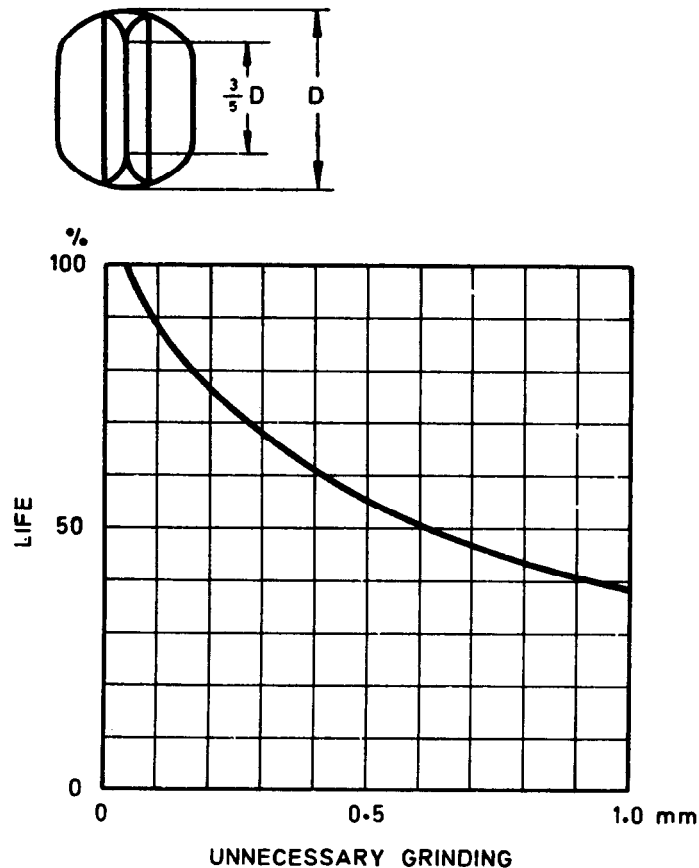


FIG. 12

6. Precautions for Proper Maintenance

- a) Plenty of water shall be used during grinding. Sudden cooling of the inserts shall be avoided.
- b) The wheel shall rotate so that it grinds from the tungsten carbide to the steel.
- c) The drill rods shall be adequately supported during the grinding operations.
- d) The grinder shall be firmly fixed and shall be fitted with effective wheel guards.
- e) Safety glasses shall be worn while grinding.
- f) Before starting to grind, the wheel shall be test run and checked for soundness.
- g) In hand grinding, proper grinding pressure shall be used to avoid over-heating of the carbide insert.
- h) The number of grindings and the grinding time shall continuously be checked to ensure that the proper quality of wheels are used.
- j) Whenever a new grinding wheel is required, information as required by IS : 1249-1972 'Recommendations for selection of grinding wheels (first revision)' shall be given to the manufacturer.
- k) The mechanical grinder shall be kept properly maintained and all the safety requirements according to IS : 1991-1973 shall be complied with.
- m) The stems shall be carefully handled during transit and storage and shall not be thrown carelessly.
- n) Worn chucks and other parts of the rock drill cause great damage to the stems. So, the wearing parts of the rock drill shall be checked often and replaced with genuine parts.
- p) Proper drilling technique shall be used.
- q) There shall be sufficient flushing air or water during drilling.

EXPLANATORY NOTE

While preparing this standard considerable assistance has been derived from the following:

SRINIVASAN(S), Grinding of drill steels. *Indian Air Comments*; 7, 3; 1974; 7-11.